SMP/E Advanced Topics: Successful Practices for Maintaining, Cloning and Rolling Out z/OS Images

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Agenda

- Installation and Maintenance Philosophy
- Consolidated Service Test and RSU
- Enhanced HOLDDATA
- IBM System z Security Portal
- SMP/E Maintenance Process
  - RECEIVE
  - APPLY CHECK
  - APPLY
  - ACCEPT CHECK
  - ACCEPT

Agenda

- Environmental Assumptions for Cloning
- Constructing Initial Run-Time Environment
- Implementing Initial Run-Time Environment
- Constructing Maintenance Environment
- Dynamic Changes
- (Heated) Discussion Points
- Finally…

Installation and Maintenance Philosophy

- Each site determines its own z/OS installation philosophy:
  - Aggressive - Install new operating system 1-5 months after GA
  - Moderate - 6-11 months after GA
  - Conservative - 12-18+ months after GA
- From a z/OS maintenance perspective:
  - Aggressive - Within 1-3 months of current RSU
  - Moderate - Within 4-9 months of current RSU
  - Conservative - Within 10+ months of current RSU
- If your site is Conservative, consider moving up to at least Moderate

Installation and Maintenance Philosophy

- As Skip Robinson says:
  - If it ain't broke don't fix it
  - Truth is, it's always broke!
  - New APARs are taken every day
- Decision point to determine higher risk:
  - Run closer to current to prevent potential issues
  - Lay back for "stability"
- My recommendation is to run closer to current
- With IBM's current testing methodology, hanging back on maintenance exposes you to greater risk than being more current on maintenance

Consolidated Service Test and RSU

- 17 years ago, IBM created Consolidated Service Test environment
  - IBM invested significant hardware and software resources to test PTFs
  - PTF's ran in CST for three months before being issued on a quarterly RSU
  - RSU - Recommended Service Upgrade
  - Riaz Ahmad's WSC Flash Announcing CST
  - CST Homepage
- I've noticed large quality improvement since CST enacted by IBM
- That's why I recommend you move closer to current
- Look to run the latest quarterly RSU

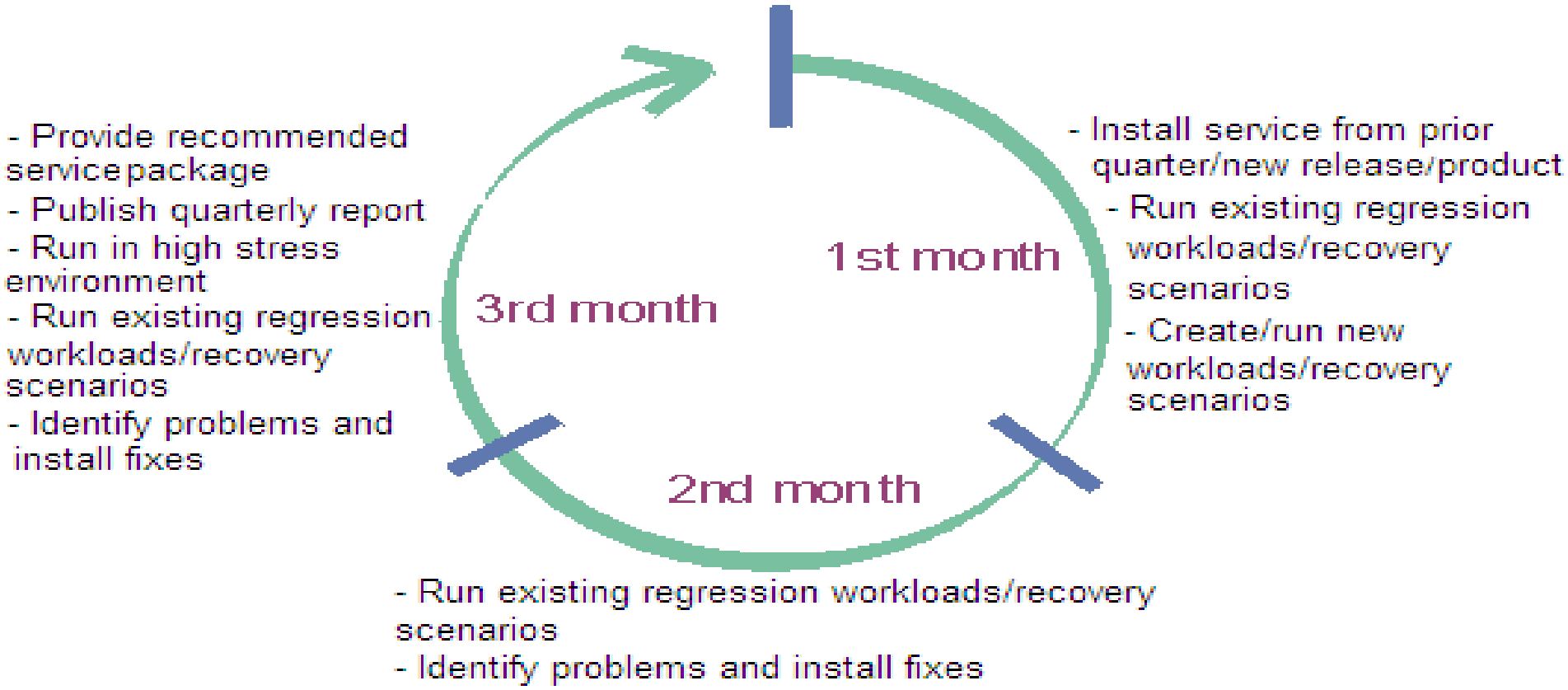
Consolidated Service Test and RSU

- From the IBM CST Home Page:

"We test in a customer-like production sysplex environment in an IBM test lab and are continuously improving our CST test environment. We run batch and data-sharing applications that exploit and stress the latest functions with up to two levels of subsystems on three levels of z/OS systems. As we test, we observe how each product runs and how they interact in this environment. We report problems to the IBM Support Center. We have the following FMIDs installed on our systems. For more information about our environment, see our CST Quarterly report."

Consolidated Service Test and RSU

- Also from the IBM CST Home Page:



Enhanced HOLDDATA

- Enhanced HOLDDATA notifies SMP/E users of PTFs in Error (PEs), High Impact PERvasive APARs (HIPERs), as well as FIX CATegory (FIXCAT) holds for IBM maintenance
- Enhanced HOLDDATA Home Page
- You want to download Full.bin
  - Two years of HOLDDATA, updated daily
  - It's the only download that includes FIXCAT
  - Contents of Full.bin automatically included in any RECEIVE ORDER command
  - Recommendation: Download prior to APPLY/ACCEPT operation
  - Recommendation: Download .bin files and use AMATERSE
  - Do not download plain text files (avoids ASCII to EBCDIC translation errors)

Enhanced HOLDDATA

- Enhanced HOLDDATA constantly updated with PE holds
- Acquire current Enhanced HOLDDATA prior to APPLY/ACCEPT
- Very difficult to apply known PE with current Enhanced HOLDDATA
- In my opinion, CST, Quarterly RSU, and Enhanced HOLDDATA enable running closer to current than ever before

System z Security Portal

- Another source of maintenance is the IBM System z Security Portal
- PTF's related to SECurity and INTegrity (SECINT)
- Security Portal is specially authorized to certain personnel at your site
- If your site does not have access to the Security Portal, get it ASAP
- Review the SECINT HOLDDATA on at least a weekly basis
- Download and RECEIVE SECINT HOLDDATA on at least a weekly basis
- IBM does not advertise or publicly disclose these fixes
- If you lookup SECINT APARs on IBMLink, they are not found
- You must order them by PTF number from IBM

SMP/E Maintenance Process

- There is a standard SMP/E Maintenance Process for both product installation and product maintenance
- The standard SMP/E Maintenance Process looks like this:
  1. RECEIVE product and/or maintenance
  2. If RECEIVE successful, APPLY CHECK product and/or maintenance
  3. Correct any errors in step 2, GOTO step 1 if maintenance required to fix
  4. If APPLY CHECK successful, APPLY product and/or maintenance
  5. Thoroughly test product and/or maintenance, and install in production
  6. After in production for a time (e.g. 30, 60, or 90 days), ACCEPT CHECK product and/or maintenance
  7. If ACCEPT CHECK successful, ACCEPT product and/or maintenance

SMP/E Maintenance Process - RECEIVE

- The first step in any SMP/E Maintenance process is RECEIVE
  - ++FUNCTION for new product
  - ++PTF for maintenance
  - ++HOLD for HOLDDATA
- For RECEIVE FROMNTS, or RECEIVE FROMNETWORK, content of RECEIVE already determined

SMP/E Maintenance Process - RECEIVE

- For RECEIVE ORDER, here are the options:
  - ALL - literally ALL available maintenance
  - APARS(<sysmod_id>) - get resolving PTF for specified APARs
  - CRITICAL - PTF's resolving HIPERs and PE's
  - HOLDDATA - just get Enhanced HOLDDATA for last two years (Full.bin)
  - PTFS(<sysmod_id>) - get specified PTFs
  - RECOMMENDED - PTFs resolving HIPERs, PE's, and having RSUyymm SOURCEIDs

SMP/E Maintenance Process - RECEIVE

- Many sites automate RECEIVE ALL on weekly or even daily basis
  - Advantage - maintenance immediately available in emergency
  - Disadvantage - updated HOLDDATA may prevent PTF's from being APPLYd
- Be aware of your site's RECEIVE ORDER policies and potential impacts on your maintenance process
- Recommend specifying a SOURCEID that clearly describes maint
  - SOURCEID's are now 1-64 characters with no blanks
  - Choose descriptive names
  - RSU1712_HIPER_PSP_FIXCAT
  - TCPIP_ATTLS_MAINT
  - etc.

SMP/E Maintenance Process - APPLY CHECK

- APPLY CHECK maintenance against an "offline" target zone
  - Target datasets should not be allocated to live system
  - Target zone should be a clone of "live" target zone
- Run APPLY CHECK with SOURCEID specified with RECEIVE and use GROUPEXTEND parm to APPLY the most corrective maintenance
- If APPLY CHECK unsuccessful, review CAUSER report and correct
  - RECEIVE any missing maintenance
  - Mount any missing USS filesystems
  - Allocate any missing target datasets
  - CAREFULLY bypass any error holds which are certain not to impact your site

SMP/E Maintenance Process - APPLY CHECK

- If APPLY CHECK successful, review ALL HOLDDATA
  - Yes, **ALL** HOLDDATA
  - For those of you ignore DOC holds, don't
  - I've seen an increase in mis-characterized HOLDDATA
  - I opened 5 PMR's in last six months for DOC holds that were really ACTION
  - Make sure you review **EVERY** piece of HOLDDATA
- Review DDDEF report to ensure that correct target datasets are updated
- After all HOLDDATA is reviewed and any ACTIONs satisfied, proceed to APPLY

SMP/E Maintenance Process - APPLY

- APPLY should run with RC=0 or RC=4
- For RC=8 and higher, review output to determine cause
  - Failures typically caused by space abends or lack of directory blocks
  - Reallocate failing datasets with new name
  - Copy failing dataset to new dataset
  - Rename failing dataset to .OLD and new dataset to correct name
- Rerun APPLY without changing any parms
  - **DO NOT USE REDO**, IT IS UNNECESSARY AND POTENTIALLY HARMFUL!
  - SMP/E is smart enough to pick up where he left off
- Once APPLY is successful, you're ready to IPL or dynamically install and test the maintenance

SMP/E Maintenance Process - ACCEPT CHECK

- I recommend ACCEPTing maintenance once successfully in production, within 30-60 days
- If there are issues with the maintenance, postpone the ACCEPT until it runs cleanly in production
- Prior to running ACCEPT, run full backup of your SMP/E environment
  - All target, program product, and DLIB volumes
  - All Unix filesystems defined to and modified by SMP/E
  - All SMP/E GLOBAL, TARGET and DLIB zones
- If something goes wrong with the ACCEPT, you can restore the backup to recover your SMP/E environment

SMP/E Maintenance Process - ACCEPT CHECK

- For those of you who never ACCEPT, you should consider doing so
  - If you ever run into a problem and have to RESTORE, you're going to either fail or RESTORE the world
  - Use the full backup of your SMP/E environment to mitigate your "risk" in ACCEPTing maintenance
- All caveats with APPLY CHECK also applicable to ACCEPT CHECK
  - Review HOLDDATA from APPLY CHECK for any pre- or post-ACCEPT items
  - Review DDDEF report to ensure correct datasets are updated

SMP/E Maintenance Process - ACCEPT CHECK

- Enhanced HOLDDATA may get in your way
- Newer ERROR HOLDs coming in after successful APPLY may prevent the ACCEPT from working
- You have two options to address this situation
  - Review the ERROR HOLD and BYPASS it if not applicable to your site
  - Allow the ACCEPT to run and ACCEPT what it will ACCEPT
  - The RC=8 is OK if the CAUSER report is for ERROR HOLDs only

SMP/E Maintenance Process - ACCEPT

- ACCEPT should run with RC=0 or RC=4
- For RC=8 and higher, review output to determine cause
  - Failures typically caused by space abends or lack of directory blocks
  - Reallocate failing datasets with new name
  - Copy failing dataset to new dataset
  - Rename failing dataset to .OLD and new dataset to correct name
- Rerun ACCEPT without changing any parms
  - **DO NOT USE REDO**, IT IS UNNECESSARY AND POTENTIALLY HARMFUL!
  - SMP/E is smart enough to pick up where he left off
- If PURGE option set to YES, ACCEPT will clean up PTF from SMPPTSx

Environmental Assumptions for Cloning

- ServerPac install completed
- Res and program product volume(s)
- Nothing indirectly cataloged
- SMP/E DDDEFs not volser pointed, no /$VERSION mount point
- SMP/E program products similarly installed
- Non-SMP/E program products also similarly installed
- Must support TEST, QA, and PROD LPARs
- Each LPAR will have "active" and "inactive" res sets
- Each LPAR has fully-functional SMP/E environment
- We'll create 6 res sets, with 6 active SMP/E environments

Constructing Initial Run-Time Environment

- After ServerPac, create maintenance ready SMP/E
- Create system symbols for maintenance volumes
- Create new master catalog if necessary for your shop
- Indirectly catalog all target datasets, create mount point for USS Shared Filesystem in Sysplex Root
- ICKDSF INIT target res and program product volumes
- COPY ServerPac res and program product volumes to target volumes
- Create SMP/E target environment
  - Allocate target CSI, ZONECOPY TZONE, ZONEEDIT DDDEFs
- Create BPXPRMxx member to mount USS maintenance filesystems

Constructing Initial Run-Time Environment

- As an example, ServerPac creates these volumes
  - ZOSRS1 – primary res volume
  - ZOSRS2 – secondary res volume
- Additional volumes you create
  - ZOSPP1 – primary program product volume
  - ZOSPP2 – secondary program product volume
- Together, these 4 volumes comprise the "res set"
- Combine onto larger DASD (mod-27, mod-54)
- If required, use process to create new master catalog

Constructing Initial Run-Time Environment

- Create system symbols for indirect cataloging
  - &SYSR1 – primary res volume
  - &SYSR2 – secondary res volume
  - &SYSP1 – primary program product volume
  - &SYSP2 – secondary program product volume
- Indirectly catalog datasets on RES set volumes
  - Use ISPF 3.4 on volume to generate list of datasets on res volume
  - Use ISPF 3.4 block commands to DELETE NOSCRATCH (or Uncatalog) and then DEF NVSAM DEVT(0000) VOL(<symbol>)
- Indirect catalog for USS datasets unnecessary
  - USS datasets will use &SYSR1 in USS dataset name

Constructing Initial Run-Time Environment

- Clone target zone MVST100 created by ServerPac to ZOSRS1
- Update ZONEINDEX in GLOBAL zone for ZOSRS1 target zone
- SMP/E UNLOAD DDDEF entries from target zone ZOSRS1
- Add UNIT(3390) VOLUME(ZOSRS1) or VOLUME(ZOSRS2) to all target DDDEFs on the res volumes
- Run UCLIN to update all DDDEFs in target zone ZOSRS1

Constructing Initial Run-Time Environment

- INITIALIZE volumes for initial run-time environment
  - ZTRS1A – primary res volume
  - ZTRS1B – secondary res volume
  - ZTPP1A – primary program product volume,
  - ZTPP1B – secondary program product volume
- Z for z/OS, T for Test, RS for RES, PP for program product, 1 for RES SET 1, A for first sequential volume, B for second sequential volume
- Use a naming convention that works for you!

Constructing Initial Run-Time Environment

- Copy datasets from ServerPac to initial run-time environment
  - ZOSRS1 → ZTRS1A
  - ZOSRS2 → ZTRS1B
  - ZOSPP1 → ZTPP1A
  - ZOSPP2 → ZTPP1B
- To copy USS datasets, rename using &SYSR1 for version filesystem
  - OMVS.ZOSV2R2.ROOT → OMVS.ZTRS1A.ROOT
  - OMVS.ZOSV2R2.VAR → OMVS.ZTRS1A.VAR
  - etc.

Constructing Initial Run-Time Environment - USS

- I used to recommend non-SMS Unix Filesystems
- Given the vast increase in the number and size of the Unix filesystems on z/OS, I now recommend using SMS Unix Filesystems
- Allocate a large SMS storagegroup dedicated to Unix filesystems
  - Better performance to spread out the I/O
  - No need to be concerned with space on res or DASD model of res volume
- Create mountpoint for Version Root in Sysplex Root
  - Use res volume name for mount point
  - Much easier to use than /SERVICE or /service
  - Version roots can remain mounted unique mount points
  - Simpler, no need to UNMOUNT/MOUNT Unix maintenance filesystems

Constructing Initial Run-Time Environment - USS

```
                    Work with Mounted File Systems

Select one or more file systems with / or action codes.
U=Unmount   A=Attributes   M=Modify   R=Reset unmount or quiesce
  Mount Point                                    File system name
_ /                                              OMVS.PRODPLEX.ROOT
_ /ZOSRS1/                                       OMVS.ZOSRS1.ZOSV2R2.VERSION
_ /ZOSRS1/usr/lpp/IBM/zosconnect                 OMVS.ZOSRS1.ZOSCON.ZFS
_ /ZOSRS1/usr/lpp/IBM/zosconnect/v2r0            OMVS.ZOSRS1.ZOSCONV2.ZFS
_ /ZOSRS1/usr/lpp/java/J7.1_64                   OMVS.ZOSRS1.JAVA7164.ZFS
_ /ZOSRS1/usr/lpp/java/J8.0_64                   OMVS.ZOSRS1.JAVA8064.ZFS
_ /ZOSRS2/                                       OMVS.ZOSRS2.ZOSV2R2.VERSION
_ /ZOSRS2/usr/lpp/IBM/zosconnect                 OMVS.ZOSRS2.ZOSCON.ZFS
_ /ZOSRS2/usr/lpp/IBM/zosconnect/v2r0            OMVS.ZOSRS2.ZOSCONV2.ZFS
_ /ZOSRS2/usr/lpp/java/J7.1_64                   OMVS.ZOSRS2.JAVA7164.ZFS
_ /ZOSRS2/usr/lpp/java/J8.0_64                   OMVS.ZOSRS2.JAVA8064.ZFS
```

Constructing Initial Run-Time Environment

- Create SMP/E target environment
  - Allocate new empty CSI to hold target zone
  - ZONECOPY ZOSRS1 to ZTRS1A and program product targets
  - ZONEEDIT DDDEF to change res and program product volumes for ZTRS1A
    - CHANGE VOLUME (ZOSRS1,ZTRS1A).
    - CHANGE VOLUME (ZOSRS2,ZTRS1B).
    - CHANGE VOLUME (ZOSPP1,ZTPP1A).
    - CHANGE VOLUME (ZOSPP2,ZTPP1B).
  - ZONEEDIT PATH for Unix filesystems
    - CHANGE PATH ('/ZTRS1A/'*,'/ZTRS1A/'*).
- Create mastercat, indirectly catalog target datasets
- Create IEASYMxx and BPXPRMxx members

Implementing Initial Run-Time Environment

- Maintenance is installed by IPL
- Backout also accomplished with IPL
- SYS1.PARMLIB is on res volume and not shared
  - Standard member suffix is "00"
  - Simplifies backout, no prompt and reply at IPL
- Sharing PARMLIB can complicate install and backout
  - Must use unique suffixes for each system
  - IPL prompt for suffix, LOADxx backout member, or rename from another LPAR required to backout unsuccessful IPL
- Managing PARMLIB beyond scope of this presentation
  - z/OS PARMLIB Successful Practices - User Experience

Implementing Initial Run-Time Environment

- Create PARMLIB concatenation
  - SYS1.PARMLIB (customized PARMLIB on res with 00 or shared with suffixes)
  - SYS1.IBM.PARMLIB (members change only with maintenance)
- Create SYSy.IPLPARM(LOADxx) for new res

```
IODF     00 SYS1
SYSCAT   ZTMCAT133CATALOG.MASTER.TEST
NUCLST   00
NUCLEUS  1
SYSPARM  00 <= Use system-specific suffix for shared PARMLIB
IEASYM   00
PARMLIB  SYS1.PARMLIB                                  ******
PARMLIB  SYS1.IBM.PARMLIB                              ******
```

Implementing Initial Run-Time Environment

- Create IEASYMxx member to define system symbols

```
SYMDEF(&SYSR2.='&SYSR1(1:5).B')
SYMDEF(&SYSP1.='&SYSR1(1:2).PP&SYSR1(5:6)')
SYMDEF(&SYSP2.='&SYSR2(1:2).PP&SYSR2(5:6)')
```

- Create BPXPRMxx member for USS filesystems

```
ROOT      FILESYSTEM('OMVS.&SYSPLEX..ROOT')
          TYPE(ZFS)
          MODE(RDWR)
MOUNT     FILESYSTEM('OMVS.&SYSR1..VAR')
          MOUNTPOINT('/var')
          TYPE(ZFS)
          MODE(RDWR)
```

Implementing Initial Run-Time Environment

- Once ZTRS1A is IPL'd and tested, time to clone
- Clone the ZTxxxx volumes to other environments (QA)
  - ZTRS1A → ZQRS1A
  - ZTRS1B → ZQRS1B
  - ZTPP1A → ZQPP1A
  - ZTPP1B → ZQPP1B
- Clone USS datasets
  - OMVS.ZTRS1A.VERSION.ROOT → OMVS.ZQRS1A.VERSION.ROOT
  - OMVS.ZTRS1A.VAR → OMVS.ZQRS1A.VAR
- Create /ZQRS1A mountpoint in sysplex root and mount version filesystems

Implementing Initial Run-Time Environment

- Clone SMP/E target environment
  - Allocate new empty CSI to hold QA target zone
  - ZONECOPY ZTRS1A to ZQRS1A and program product targets
  - ZONEEDIT DDDEF to change res and program product volumes for ZQRS1A
    - CHANGE VOLUME (ZTRS1A,ZQRS1A).
    - CHANGE VOLUME (ZTRS1B,ZQRS1B).
    - CHANGE VOLUME (ZTPP1A,ZQPP1A).
    - CHANGE VOLUME (ZTPP1B,ZQPPB).
  - ZONEEDIT PATH for Unix filesystems
    - CHANGE PATH ('/ZTRS1A/'*,'/ZQRS1A/'*).
- Create mastercat, indirectly catalog target datasets
- Create IEASYMxx and BPXPRMxx members

Implementing Initial Run-Time Environment

- After ZQRS1A is IPL'd and tested, clone to production
- Once cloned to production and tested, initial run-time environment is now complete
- But seriously, how many times do you roll-out from Test to QA to PROD with no problems?
- Somewhere along the way, you may have to apply some maintenance
- On to the maintenance environment….

Constructing Maintenance Environment

- Backup vols listed below, as well as DLIB and SMP/E vols
  - This step not performed during initial creation
- INITIALIZE volumes for the maintenance environment
  - ZTRS2A – primary res volume
  - ZTRS2B – secondary res volume
  - ZTPP2A – primary program product volume
  - ZTPP2B – secondary program product volume

Constructing Maintenance Environment

- Copy vols from run-time to maintenance environment
  - ZTRS1A → ZTRS2A
  - ZTRS1B → ZTRS2B
  - ZTPP1A → ZTPP2A
  - ZTPP1B → ZTPP2B
- When copying USS datasets, rename using &SYSR1
  - OMVS.ZTRS1A.VERSION.ROOT → OMVS.ZTRS2A.VERSION.ROOT
  - OMVS.ZTRS1A.VAR → OMVS.ZTRS2A.VAR
  - etc.
- Create /ZTRS2A mountpoint in sysplex root and mount version filesystems

Constructing Maintenance Environment

- Clone SMP/E target environment
  - Allocate new empty CSI to hold ZTRS2A target zone
  - ZONECOPY ZTRS1A to ZTRS2A
  - ZONECOPY program product targets
  - ZONEEDIT DDDEF to change res and program product volumes for ZTRS2A
    - CHANGE VOLUME (ZTRS1A,ZTRS2A).
    - CHANGE VOLUME (ZTRS1B,ZTRS2B).
    - CHANGE VOLUME (ZTPP1A,ZTPP2A).
    - CHANGE VOLUME (ZTPP1B,ZTPP2B).
  - ZONEEDIT PATH for Unix filesystems
    - CHANGE PATH ('/ZTRS1A/'*,'/ZTRS2A/'*).
- Create mastercat, indirectly catalog target datasets

Constructing Maintenance Environment

- Create /ZTRS2A mountpoint in sysplex root and mount version filesystems
- Run your SMP/E APPLY or APPLYs
- Create IEASYMxx and BPXPRMxx members
- IPL and test
- When tested, roll out to QA and PROD as before
- Production TZONE is ZPRS1A
- When ACCEPTing maint, relate MVSD100 to ZTRSxA, depending on the current active target zone

Dynamic Changes

- Dynamic changes can be useful, but are often tricky
- The WAC (World According to Conley) rule of thumb is to use a dynamic change only to avoid an IPL
- Dynamic changes invalidate SMP/E environment, due to manual copies to the affected targets
  - Assumes you're not applying maintenance directly to active target datasets)
  - Manual copies to affected targets are error-prone
- But, but, but…Dynamic LPA (and possibly LLA REFRESH)!
  - If LINKLIST is also affected, difficult to impossible to coordinate changes
  - Interdependency between LPALIB and LINKLIST means "your results may be unpredictable"

Dynamic Changes

- z/OS V1R12 delivered ability to update LPA and SVC table
  - You cannot update other SVC properties, such as EPNAME, TYPE, APF, etc.
  - SVC's must be predefined with all properties you require
  - If you need updates to EPNAME, TYPE, etc., then you need an IPL
- USS provides F OMVS,ACTIVATE=SERVICE
  - Set up dynamic service facility in BPXPRMxx, then IPL or SET OMVS=xx
  - If there are LINKLIST/LPA dependencies, "your results may be unpredictable"
- Due to above, dynamic changes should be used sparingly
  - In an emergency to avoid an IPL
  - When scope of change is small with little impact
  - When using dynamic change, schedule an IPL ASAP to synchronize with SMP/E

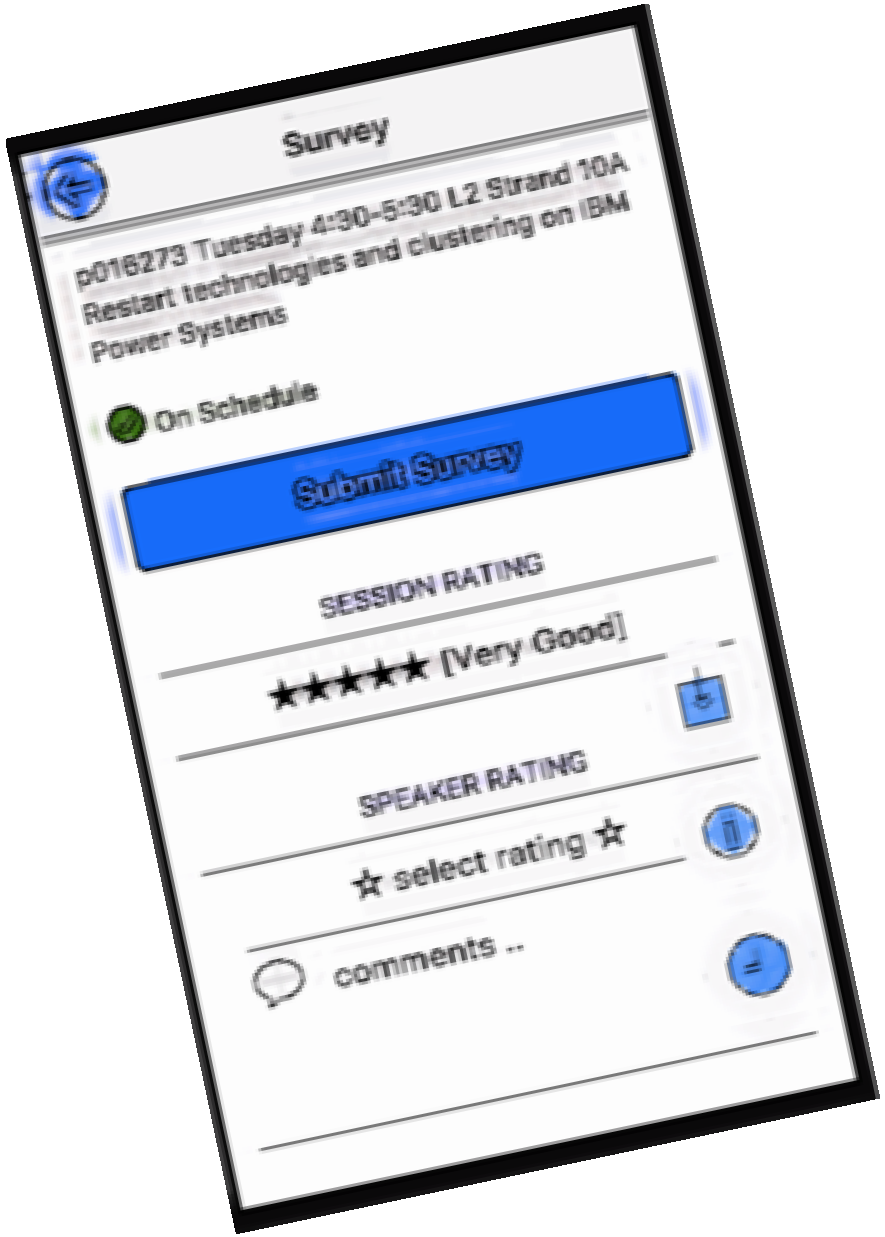
(Heated) Discussion Points

- Use larger DASD volumes to eliminate secondary res volumes
- Coordinating CICS, DB2, IMS, and program products? Shirley you can't be serious. I am serious.....
- Biggest objection is "we can't possibly do CICS, DB2, IMS, and program products that way",
  - It works for MVS, JES2, DFSMS, etc., so why not?
  - Test and roll out maintenance in a unified manner?
- Another objection, "This won't work in big shops, the MVS guys barely talk to the database guys"
  - Time to improve your communication
- Let the heated discussions begin!

Finally…

- Please fill out an evaluation, your comments help me to deliver a better presentation
- I'd like to hear about how you roll-out maintenance
- Please Email me with comments and/or questions at pinncons@rochester.rr.com

Please complete the session survey!



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